

REMARKS

Reconsideration of the above identified application is respectfully requested.

Applicants traverse the objection to claim 9 under Rule 75(c) since the quoted expression indeed further limits the subject matter of claim 3, and the examiner has not shown otherwise.

Note that claims 9 and 10 recite different species; with claim 9 reciting the species in which the channels 40 are formed "in said substrate" as shown in figure 4; and claim 10 recites the different species in which the channels 40 are formed "in said bond coat" as shown in figure 5.

The two different species recited in claims 9 and 10 similarly depend from the more generic claims 4 and 3, in turn.

Claim 3 recites the generic species in which the shroud includes a substrate wall, a bond coat thereon, and a thermal barrier coating on the bond coat in a three-layer lamination. The flow channels are generically recited between the wall and the bond coat.

Claim 9 further limits claim 3 by expressly reciting that the channels are formed "in" the substrate; whereas claim 10 recites that the channels are formed "in" the bond In both species, however, the flow channels are still formed between the bond coat and substrate wall as clearly visible in figures 4 and 5.

Accordingly, withdrawal of the objection to claim 9 is warranted and is requested.

Applicants note the substantial breadth interpretation of Applicants' claims being proffered by the examiner, which correspondingly enlarges claim scope in later infringement analysis of the file wrapper. However, the examiner has failed to afford due weight to specific features and cooperation of features which distinguish over the

applied art.

However, in view of the multiple rejections of the claims based on the common Lee ('003) reference, Applicants have chosen to amend the claims, and thus render all the rejections of record moot.

More specifically features from claims 2 and 4 have been added to claim 1 to recite the cooperation of the inlets 42, outlets 44, and the corresponding headers 48,50.

Claims 2 and 4 have been amended as described below.

Similarly, similar features from claims 12 and 17 have been added to independent claim 11 to recite the cooperation of the inlet 42, outlets 44, and the corresponding headers 48,50.

Claim 12 has therefore been canceled, without prejudice; claim 13 has been amended to depend from claim 11; and claim 17 has been amended like claim 4.

The Background section explains the sophisticated nature of cooling in gas turbine engines, and the art therefor is The various references of record amply quite crowded. support this crowded nature, and the significance of even apparently small changes in cooling designs, nevertheless have profound or significant advantages in turbine component cooling.

In view of the amendment of claim 11, withdrawal of the rejection thereof under Section 102(a) over Lee ('003) et al is now warranted and is requested.

In view of the amendment of claim 1, withdrawal of the rejection thereof under Section 103(a) over Sloop et al and Lee ('003) et al is now warranted and is requested.

It is noted that Applicants traverse all the rejections made by the examiner under Section 103, and the various contentions therefor for failing to meet the stringent requirements of MPEP 706.02(j), and failing to provide legal motivation and evidence therefor as required in MPEP ch. 2100.

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The various rejections fail to afford due weight to the whole of each claim being rejected; fail to evaluate each reference in the whole; and are conspicuous in the precision extraction of naked elements from the references without regard to context, and combining such naked elements in impermissible hindsight using Applicants' claims the quide.

Since the features of claim 2 have been added to claim 1, claim 2 has been amended to recite the inlets 42 being sized to meter flow to the channels as disclosed at para. 39.

The rejection of claim 2 under Section 103 over Sloop et al, Lee ('003) et al, and Gupta et al is traversed since the three references are fundamentally different from each other and the examiner's hindsight combination thereof fails to establish even a prima facie showing.

The examiner simply opines that Sloop and Lee ('003) would have been combined for claim 1 "for the purpose of allowing turbine engine shroud running at higher operating temperature," yet this statement is mere conclusion, and is neither legal motivation nor supported by any evidence identified in the disparate references for combining them in any manner, let alone the manner as found in original claims 1 & 2, or now, amended claims 1 & 2.

For claim 2, the examiner simply opines that the three references would have been combined "for the purpose of forming a cooling fluid film along the surface of the shroud exposed to the gas flow path," yet this statement, too, is mere hindsight conclusion, and is neither legal motivation nor supported by any evidence identified in the disparate references for combining them in any manner, let alone the manner as found in original glaims 1 & 2, or now, amended claims 1 & 2.

The examiner's attempt to combine Gupta for "aperture outlets 18" disregards the basic teachings of the three disparate references, and the express combination being

recited.

In Lee ('003), the TBC 24 is porous, col. 5, 1. 46, for discharging the air from the microchannels 20.

In Sloop, the thermal barrier material 37 is found on the metallic base 30, with no flow communication therebetween because Sloop teaches the special flow circuits (43,44) independent of the barrier 37.

And, in Gupta, the aperture 12,18 extends fully through the wall 10, without any nexus with either Lee ('003) or Sloop, and the examiner has not shown otherwise.

examiner's attempt to combine these disparate references for the rote contention of some form of better cooling does not comply with the stringent requirements of the MPEP in identifying specific problems and specific solutions, and why those solutions would have been suggested by evidence in the references being applied.

Of course, all the references of record which relate to cooling correspondingly effect some improvement, but those improvements are specific to the specific combinations being disclosed in those references, and are not necessarily applicable to different combinations.

The various references of record cannot be used as mere parts bins to select therefrom any feature to the exclusion of other features in the hindsight attempt to (re)combine them based on Applicants' specific claims as the guide.

For amended claim 2, it is not seen how the three references Lee ('003), Sloop, and Gupta disclose or suggest the combination recited therein, which now includes metering inlets 42.

The three references have different structure and function, and any metering capability therein would inherently be different than that found in the express combination being recited in claim 2.

Accordingly, withdrawal of the rejection of claim 2 under Section 103(a) over Sloop et al, Lee ('003) et al, and

Gupta et al is warranted and is requested.

Applicants traverse the rejection of claim 3 under Section 103(a) over Sloop et al, Lee ('003) et al, Gupta et al, and the repeated use of Lee ('003) et al.

The examiner's attempt to selectively combine these three disparate references again fails to recognize the fundamental differences thereof, including the solid metal barrier between the thermal barrier material 37 in Sloop and the independent passages 43,44 therebelow.

In Applicants' claim 3 the bond coat 46 cooperates with the TBC 38 and the network of flow channels 40; yet in the proposed combination of the examiner's references analogous cooperation is disclosed or suggested.

Furthermore, claim 3 has been amended to recite that the bond coat seals the flow channels for discharging the coolant solely from the cooperating outlets 44 as disclosed at para. 43.

In Lee ('003), the TBC 24 is expressly porous; in Sloop, the thermal barrier 37 is already sealed from the internal passages 43,44 by the metallic base 30; and in Gupta, the aperture 18,12 renders moot any sealing affect of a bond coat under the TBC.

The examiner's mere contention for combining these disparate references "for the purpose of preventing the separating of the thermal barrier coat from the substrate" is clearly not legal motivation, nor based on identified evidence; proposes to solve a problem not found in the combination of the applied references; and fails to afford due weight to the express combination which is much more than the introduction of the bond coat per se.

Accordingly, withdrawal of the rejection of claim 3 under Section 103(a) over Sloop et al, Lee ('003) et al, Gupta et al, and Lee ('003) et al is warranted and is requested.

Applicants traverse the rejection of claims 4-6 and 9

under Section 103(a) over Sloop et al, Lee ('003) et al, Gupta et al, and Hultgren et al.

The examiner now compounds the multiple errors by further combining four disparate references in surgical precision which is clear evidence of impermissible hindsight. Mindful that the mere number of references being combined is relevant per se, but these four references fundamentally different from each other, and the examiner is therefore constrained to select naked features therefrom without regard to the whole thereof, clearly, again using Applicants' claims as the guide to combine.

As indicated above, claim 1 has been amended to include features from claims 2 and 4, and now recites the cooperation of inlets 42 feeding the inlet header 48, with the flow from the channels 40 being discharged to the outlet header 50 and then from the outlets 44 for the advantages disclosed in the specification.

The examiner admits some of the fundamental shortcomings of his proposed combination of the three disparate references Sloop, Lee ('003), and Gupta; and then attempts to simply combine the yet further disparate features of Hultgren without regard to the different context thereof, different problems, and different solutions.

The examiner's combination of the four references lacks any indication of what the actual "modifications" should entail; and is based on the mere rote contention "for the purpose of reducing the backpressure losses in the cooling system of the gas turbine engine" which, yet again, is not legal motivation, nor based on any identified evidence in the references being applied.

In the basic reference Sloop, the flow passages 43,44 are independent of the thermal barrier 37, and have special forms and special paths not relevant to the secondary reference Lee ('003) being initially combined therewith. examiner has failed to show any nexus between

microchannels 20 of Lee ('003) and the different flow passages 43,44 of Sloop.

And, in Gupta, the mere aperture 18,12 is disclosed that extends completely through the wall 10, without any nexus with Sloop and Lee ('003), and the examiner has not shown otherwise.

Compounding these compiling errors of combination, the examiner attempts to simply add Hultgren, but how, and for what legal motivation?

Figure 6b of Hultgren has no relevance to any of the other three references, and the examiner has not shown otherwise. The examiner attempts to use the mere figure 6b of Hultgren with the three other references without any explanation of the specific modification thereof and legal motivation therefor.

The examiner's stated reason "for ... reducing the backpressure losses..." is a mere hindsight fabrication divorced from the reality of the Hultgren reference itself, and the other three references.

What does figure 6b of Hultgren disclose?

Hultgren is quite clear that figure 6b relates to the layer 17.

What is layer 17?

Hultgren again makes quite clear that layers 17 and 18 define the passageway 59 therebetween, and these features are found in the cap 9.

What is that cap 9?

That cap 9, like the impingement baffle independent elements disposed below the inner shroud 3. Note in figure 4 of Hultgren the various holes, channels, and cooling features pertaining to this complex configuration at the inner end of the vanes 7. Of what relevance is all this structure to the other three applied references, and to Applicants' claims?

Where is any analogous containment cap 9 from Hultgren

found in any one of those three references for which any modification thereof might be made?

the examiner has failed to address Clearly, fundamental differences of the four disparate references, and instead looks merely to naked elements therein, and attempts to combine them in clear hindsight using Applicants' claims as the guide, and not any teachings in these very references for combinations thereof, if any, as would be suggested to one skilled in the art, without the advantage of knowing Applicants' claims in advance.

Note further that claim 1 as presently amended recites the cooperation of the inlets 42 with the inlet header 48 to the flow channels, and the further cooperation with the outlet header 50 therewith, and with the outlets 44.

The examiner has identified no analogous features in the four disparate references, nor can those four references be combined in this manner without rendering inoperative for their intended purposes those references.

The MPEP mandates that the examiner combine references modifying one, and that modification cannot render inoperative that reference, nor amount to a reconstruction thereof using Applicants' claims as the guide.

The MPEP also requires that references be combined for reasons specifically found in the references themselves for solving specifically identified problems relevant to references. The examiner has not met this burden.

It is quite easy to reconstruct claims in a patent application by the mere uncovering of naked elements in various references, as the examiner has done; yet it is quite another matter to then evaluate those same references in the whole to determine which elements should be combined and why; and which elements should not be modified or combined, and why.

The analysis required by the MPEP is stringent, and is based fundamentally on identifying problems in the very

references being applied and finding legal motivation for combining express features of the references in accordance with the very teachings thereof, without using the expedient of Applicants' claims as the guide.

Clearly, the examiner's need to combine four disparate references, for different features thereof, and without regard to the whole of these references is evidence in and of itself of the non-obviousness of Applicants' claims, including now amended claim 1, since even with the benefit of hindsight, the errors in the proposed combination are conspicuous.

Since features of claim 4 have been added to claim 1, claim 4 has been amended to conform therewith, and now recites the row of cross channels 40 extending between the previously introduced inlet and outlet headers 48,50.

As indicated above, the examiner has failed to explain the specific combination of the four references relevant to this claim. And note quite significantly, that if the flow passages 43,44 of Sloop were to be reconfigured like figure 6b of Hultgren, that reconfiguration would appear to render inoperative Sloop for its intended purpose.

The channels 43 and 44 are different from each other and traverse the metal base differently than the containment cap 9 of Hultgren. And, the containment cap 9 of Hultgren has no disclosed nexus with the seal 11 of Sloop. Should the cap 9 be introduced inside that seal 11 in the manner of figure 3 thereof, or should that containment cap be added to the seal 11 in the manner of figure 4 of Hultgren, and therefore leave unaltered the seal 11 itself? What do the references teach in this regard?

Claims 5 and 6 recite the species of the cross channels 40, yet as indicated above the examiner has failed to support the combination of figure 6b of Hultgren with any figure or feature of Sloop in view of the different nature thereof.

Claim 9 recites that the channels 40 are disposed in the

substrate 28 below the bond coat 46.

The flowpaths 45 in Hultgren are clearly found in the cap 9 remote from the inner shroud 3, and have no disclosed nexus with the passages 43,44 in Sloop.

And. the passages 43,44 in Sloop circumferentially along the seals 11, and clearly lack any analogous header and orientation as recited in this claim, and lack any nexus to the flow configuration of Hultgren being applied by the examiner without regard to the requisite flowpaths therein.

Accordingly, withdrawal of the rejection of claims 4-6 and 9 under Section 103(a) over Sloop et al, Lee ('003) et al, Gupta et al, and Hultgren et al is warranted and is requested.

Applicants traverse the rejection of claim 10 under Section 103(a) over Sloop et al, Lee ('003) et al, Gupta et al, Hultgren et al, and Lee ('003) et al, yet again.

This five-reference rejection is evidence in and of itself of the failure to comply with the stringent requirements of the MPEP, and failure to establish even a prima facie showing.

The examiner again merely opines that these references would have been combined and modified, without explaining such modification, "for the purpose of reducing temperature of the bond coat."

Yet again, this is not legal motivation, and disregards the fundamental teachings of these references.

Claim 10 recites that the channels 40 are disposed in the bond coat 46, and the examiner attempts to use figure 5 of Lee ('003) without regard to the context thereof, and without regard to the other references.

The bond coat 22 is part of the coating system with the TBC 24 which coat the top of the substrate 4 in Lee ('003).

In Sloop, the thermal barrier 37 clearly coats the top of the metallic base 30 quite remote from the internal flow

passages 43,44 buried therein.

So, does the examiner contend that those passages 43,44 should now be relocated into the bond coat provided below the thermal barrier 37 and the metallic substrate 30? Of course not since this combination would not appear possible, especially since bond coats are mere mils in thickness, and the substantial passages 43,44 in Sloop would not appear to somehow they could operable or effective if reconfigured inside the thin bond coat instead of the metallic base 30 as presently disclosed.

The simplicity of the examiner's rejection is yet again clear evidence of the failure to afford any weight, let alone due weight, to the various claims and the various references being applied.

Naked elements are being found in the disparate references by the examiner without regard to the context thereof, and simply combined without regard to the very teachings of those references in the academic exercise of rejecting the claims under Section 103, without meeting the stringent requirements thereof.

Accordingly, withdrawal of the rejection of claim 10 under Section 103(a) over Sloop et al, Lee ('003) et al, Gupta et al, Hultgren et al, and Lee ('003) et al is warranted and is requested.

Applicants traverse the rejection of claims 12-16 under Section 103(a) over Lee ('003) et al and Gupta et al.

Since features from claim 17 have been added to independent claim 11, this rejection has been rendered moot.

Furthermore, the examiner's contentions fail to meet the requirements of the MPEP, and fail to establish even a prima facie showing.

The examiner's attempt to combine the film cooling holes 18,12 of Gupta with the porous TBC 24 of Lee ('003) fails to recognize the fundamental differences thereof, and the examiner's proposed contention "for the purpose of forming a

cooling fluid film along the surface of the shroud exposed to the gas flow path" is clearly not legal motivation, and is not supported by any evidence in these references.

Indeed, Lee ('003) already teaches "transpiration cooling, col. 3, 11. 24+, which is effected by the porous TBC 24 fed from the microchannels 20.

So, if Lee ('003) already teaches such transpiration cooling, why would one skilled in the art want to replace that transpiration with the film cooling holes of Gupta as the examiner contends? Would not that render inoperative the transpiration cooling in Lee ('003)?

Or, does the examiner contend that the film cooling holes 18,12 of Gupta would supplement the transpiration cooling of Lee ('003), and if so where is this taught, and how should the holes 18,12 of Gupta be combined?

Should the holes 18,12 of Gupta have inlets inside the microchannels 20 of Lee ('003)? And, if so would not then render inoperative the transpiration cooling of the porous TBC 24 since the air would surely travel the path of least resistance through those large holes 18,12 instead of the small pores of the TBC which would have considerable flow resistance?

Accordingly, withdrawal of the rejection of claims 12-16 under Section 103(a) over Lee ('003) et al and Gupta et al is warranted and is requested.

Applicants traverse the rejection of claims 17-19 under Section 103(a) over Lee ('003) et al, Gupta et al, and Hultgren et al. .

The examiner's repeated use of Hultgren "for the purpose of reducing backpressure losses in the cooling system of the · gas turbine engine" is clearly not legal motivation, and just as clearly fails to afford due weight to the express claim language, due weight to the whole of the claims, and dueweight to the whole of these references.

The examiner's brief comments are indicative of the rush

to reject the claims without regard to the substantial differences between the references themselves, and without regard to the express claim language.

Fundamentally, the examiner has failed to establish any nexus between the different cooling configurations Hultgren and those of Lee ('003) and Gupta being combined therewith.

As indicated above, figure 6b in Hultgren is relevant to the containment cap 9, which is expressly different than the impingement baffle 8, and expressly different than the inner shroud 3, and expressly different than the other applied references.

The features of figure 6b are not located anywhere near the exposed surface of the inner shroud 3 on which any TBC would be applied in Lee ('003) and Gupta.

The examiner has failed to establish any nexus of the microchannels 20 of Lee ('003), which are expressly found in the TBC/Bond coat system as distinct from the underlying metallic substrate, with the cap 9 of Hultgren which would necessarily be located remote therefrom in accordance with the express teachings of Hultgren itself.

The examiner's use of film cooling holes 18,12 of Gupta would appear to have more relevancy to the outlet 28 in the inner shroud of Hultgren, which, yet again, is remote from the containment cap 9 also being used by the examiner.

The examiner's use of these three references is overly simplistic, and therefore fails to afford due weight to express claim features, as well as fails to afford due weight to the very teachings of these references being applied in clear hindsight for naked elements thereof divorced from their express_cooperation therein.

As indicated above, features from claim 17 have been added to independent claim 11, which is well distinguishable over the applied references for the reasons presented above.

Claim 14 has been amended to recite that the bond coat

seals the flow channels, and the coolant therefore is discharged from the aperture outlets 44.

Claim 17 maintains its recitation that the cross channels 40 extend between the headers 48,50 for channeling the coolant in the specific manner confined by this combination of elements, neither disclosed nor suggested in the applied references.

To the contrary, the Lee ('003) reference being applied by the examiner teaches that the TBC 24 is porous for discharging the air therethrough from the microchannels 20.

In Gupta, the apertures 18,12 extend completely through the wall 10, without regard to any microchannels 20 which might be formed below the TBC layer 22.

And, in Hultgren the figure 6b features being applied by the examiner are found in the cap 9, which is well remote from the outboard surface 30 on which TBC might be applied.

The examiner has therefore failed to establish even a prima facie showing to reject claims 17-19 which recite species of the channels in combination with the TBC as recited in their parent claims.

Accordingly, withdrawal of the rejection of claims 17-19 under Section 103(a) over Lee ('003) et al, Gupta et al, and Hultgren et al is warranted and is requested.

Applicants traverse the rejection of claim 23 under Section 103(a) over Lee ('003) et al, Gupta et al, Hultgren et al, and Sloop et al.

The examiner's l1-line contention on page 10 includes a long series of "modified" without explaining any modification; and "for cooling the gas turbine engine shroud," which is clearly not legal motivation.

The "modification" contention by the examiner is conspicuous in overlooking the fundamental teachings of the four disparate references, and selecting naked elements without regard to context.

The examiner admits that Lee ('003) and Gupta do not

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teach the "arcuate turbine shroud," and then attempts to apply Sloop for its teaching of arcuate shroud, without regard to the fundamental teachings thereof that the passages 43,44 are quite remote from the thermal barrier 37, and therefore teach away from any combination relevant to Applicants' claims.

Note further that the examiner is also applying Hultgren which teaches a quite different inner shroud 3 for the vanes 7, not the blades of Sloop; and the cap 9 is quite remote from the inner shroud 3 whose outer surface 30 would require TBC according to the examiner's combination. Yet, even so, that combination is not relevant to the claims as recited.

examiner's application of the four disparate references has overlooked the express combination recited in claim 23 which is a specially configured turbine shroud having the cooperating TBC 38 and network of flow channels 40 with inlet 42, inlet header 48, outlet header 50, and outlets

The TBC 24 in Lee ('003) expressly cooperates with the microchannels 20 in a combination that does not require any modification whatsoever, and clearly no modification based on the other references being applied by the examiner.

The TBC 22 in Gupta protects the wall 10 through which the film cooling aperture 18,12 extends; and which has no disclosed utility for combination with Lee ('003), nor any suggestion to do so without rendering Lee ('003) inoperative.

The containment cap 9 has no disclosed nexus with the outboard surface 30 of the inner shroud on which any TBC would be located according to Lee ('003) and Gupta.

And Sloop, the main reference being applied by the examiner for its arcuate configuration, has passages 43,44 of special configuration and special flowpaths quite remote from the thermal barrier 37 and quite different than any of the configurations of Lee ('003), Gupta, and Hultgren also being used by the examiner in some unexplained combination

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therewith.

The combination of features in claim 23 is fundamentally different than any one or more of the four disparate references being applied by the examiner, which references the examiner must conspicuously treat not for what they in fact teach, but for naked elements thereof devoid of context in the clear teachings of these references.

Such naked elements, like the parts in a hardware store, the examiner attempts to combine using Applicants' claims as the guide without addressing the whole of those claims or the whole of those references individually, and collectively.

Accordingly, withdrawal of the rejection of claim 23 under Section 103(a) over Lee ('003) et al, Gupta et al, Hultgren et al, and Sloop et al is warranted and is requested.

Applicants note the allowability of claims 7, 8, 20-22, and 24-27, but the rewriting thereof is not warranted in view of the above amendments and remarks.

Claim 28 has been added to recite the film cooling holes 52 which extend through the substrate and TBC for separately providing film cooling of the TBC in a different flowpath than the internal network of flow channels 40. This species is disclosed at para. 52, for example, and enjoys the specific advantages of the combination as presented in the specification.

In Lee ('003), the microchannels cooperate with the porous TBC 24 without any suggestion of separate film cooling apertures.

In Gupta, the film cooling aperture 18,12 extends through the wall 10 without any suggestion of porous transpiration cooling of the TBC 22 therein.

In Sloop, the passages 43,44 are well embedded inside the metallic base remote from the thermal barrier 37 for providing specialized cooling.

And, in Hultgren the cap 9 and its flow passages are

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located remote from the inner shroud 3 without regard to any TBC which might coat the outboard surface 30. inclined holes 27,28 in the shroud 3 which have no disclosed nexus with the features of the other references applied by the examiner.

Now, of course, the examiner can review claim 28 not for the combination thereof, but for the naked elements contained therein, now including the film cooling holes 52.

And, yet again, like he has already done in the present office action, the examiner can and will find naked film cooling holes, like that shown in Gupta, and merely opine that the (multiple) references would have been "modified" to include film cooling holes "for the purpose of cooling by using film air," in yet another bootstrap rejection of the claims without regard to whole teachings of the references.

In claim 23, the film cooling holes provide independent flowpath for the air coolant and provide external cooling of the TBC. Those film cooling holes also cooperate with the internal network of flow channels as explained in the specification for the advantages thereof.

There appears to be no teaching in the references of any such combination of the recited network flow channels in the first instance, and no teaching of their cooperation with conventional film cooling holes specifically introduced in the shroud for the combined protection thereof.

Accordingly, added claim 28 is well distinguishable over the applied references.

The examiner's comments regarding reference Guibert et al are noted, as well as the ceramic ring 5. The examiner has not provided any comments for reference Beeck et al, also cited by the examiner, and he may choose to do so in the next office communication.

In accordance with the duty imposed by 37 CFR 1.104 and MPEP sections 707, 707.05, 707.07, and 707.07(g), examiner is requested to reconsider all the art of record,

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including the additional references not applied, to ensure full compliance with the required thoroughness of examination.

In re Portola Packaging, Inc., 42 USPQ2d 1295 (Fed. Cir. 1997) emphasizes the importance of complying with this duty to ensure that all references of record have been fully considered by the examiner in the various combinations thereof. And, the Board of Appeals has further elaborated on the importance of this examiner duty in Ex parte Schricker, 56 USPQ2d 1723 (B.F.A.I. 2000).

In view of the above remarks, allowance of all claims 1- 11 and $^{13-28}$ over the art of record is warranted and is requested.

Respectfully submitted,

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